GREENING THE SYSTEM: KING COUNTY'S APPROACH TO OVERHAULING AN AGING RECYCLING AND TRANSFER SYSTEM NETWORK

Nori L. Catabay
Solid Waste Division
King County
Seattle, WA

ABSTRACT
A recycling and transfer station is the face of a solid waste agency; a place where the public not only interacts daily with staff, but is able to participate in building a sustainable community through recycling. Building a good relationship with the community requires addressing their concerns and being responsive to their needs. The agency also has the responsibility of operating an efficient facility that will handle current and future needs of the region.

King County, like many jurisdictions, is addressing the challenges of a changing waste stream, increased need for material reuse and recycling, and a new destination for its disposed waste. The county currently disposes over 800,000 tons per year of municipal solid waste, with 50% of MSW generated in the county being diverted from disposal for recycling. Current estimates project King County closing its regional landfill, which has served the county since the early 1960s, around 2025 and transitioning to future disposal alternatives. In response, King County is implementing an overhaul of its recycling and transfer facilities, plus adding increased material sorting and recycling capabilities to divert even more material. These infrastructure upgrades are enabling King County to lead by example by implementing innovative green solutions that reduce operating costs, greenhouse gas emissions, and water consumption, among other benefits, and at the same time improving recycling services that the facilities provide.

This discussion will take a step-by-step approach to show how King County used community input and outreach, sustainable building elements, and life-cycle cost assessment to successfully initiate implementation of its solid waste transfer and waste management plan. This journey begins with the now completed Shoreline Recycling and Transfer Station, featuring renewable energy production, rainwater reuse, and construction material reuse - awarding it the first Leadership in Energy and Environmental Design (LEED) Platinum certification for a transfer station in the United States. LEED is a national rating system for high-performance, sustainable building developed by the U.S. Green Building Council.

The lessons learned from the Shoreline project have provided the County with a roadmap for replacing their Factoria Recycling and Transfer Station, rebuilding the Bow Lake Recycling and Transfer Station, and improving the Houghton Transfer Station. Both Factoria and Bow Lake projects are positioned to be awarded a LEED Gold certification. The Houghton project was the first King County Project to pilot the King County Sustainable Infrastructure Scorecard, which the County developed to use when projects were not eligible for the LEED Rating System. Looking towards the future to address continued growth in the region, the County is in the preliminary planning stages of developing North- and South-County Recycling and Transfer Stations with the goal of even higher integration of green building, and sustainable development features. Community input and participation in siting these facilities is a high priority for integrating them within neighborhoods.

Concepts that Attendees will learn:

1. Green building and sustainable development can help solidify community support to site and construct projects in both urban and rural settings.

2. Green building is scalable: it can be implemented at multiple levels, from new facilities to basic upgrades.

3. Green building practices, when applied, result in lower life cycle costs than in more conventional building designs, and at the same time improve recycling services and waste management.

BACKGROUND

The Solid Waste Division (SWD) provides garbage transfer, disposal and recycling services for residents and businesses in all of King County, except for Seattle and Milton. SWD also provides household hazardous waste disposal options and recycling education programs for its residents.

SWD's service area has a population of about 1.28 million, or about 70 percent of King County's population as a whole. Most of the customers live in incorporated areas of the county. King County customers dispose of more than 800,000 tons of solid waste each year.

SWD's customers include commercial haulers, as well as both residential and non-residential self-haulers who use county transfer station facilities. SWD does not provide residential curbside collection. Garbage that is collected in the county's service area by the commercial haulers is taken to SWD transfer stations, where it is packed into larger transfer trailers for transport to the Cedar Hills Regional Landfill for disposal. The transfer stations also are open to the general public, who may bring garbage to the stations in addition to using curbside collection services. In addition to garbage disposal, basic recycling services are available at no charge at most stations.

One of SWD's highest priorities is to reduce the overall amount of material that is disposed through the implementation of innovative waste reduction and recycling services - at county facilities and in the communities - and specialized programs. SWD's overall 'Zero Waste of Resources' goal is to conserve natural and reusable resources through readily available services and a continued emphasis on public awareness.

The King County Green Building Initiative started in 2001 with an Executive Order which was replaced by an ordinance in 2005 and renewed in 2008 with the Green Building and Sustainable Development Ordinance 16147. Requirements include:

• The ordinance covers all King County-owned and county-financed projects, including projects using alternative financing.

• All eligible new construction and major remodel and renovation projects are required to achieve the LEED Gold certification.

• All capital projects that are not eligible or are limited in their ability to achieve LEED certification (e.g., infrastructure projects) must incorporate cost-effective green building and sustainable development practices using a county-developed "scorecard" or checklist.

• The County-wide Green Building Team is directed to develop guidelines for using green practices in operating and remodeling existing buildings.

• The ordinance also specifies reporting requirements to improve the information compiled on county divisions' green practices; continues the county-wide Green Building Team and clarifies its roles and responsibilities; and requires project managers to be trained in green building practices.

King County established an internal Green Building Team to serve its departments responsible for capital projects and operating existing facilities. The goals of the Green Building Team are to: encourage green building practices in all King County building projects, including new construction, renovation and remodeling; direct county offices and departments to incorporate the use of the Leadership in Energy and Environmental Design (LEED™) green building rating system; and provide education and guidance to county departments.

SWD sponsors the internal Green Building Team through its GreenTools Program. The GreenTools program is designed to help all King County stakeholders green their built environment while addressing critical environmental issues, such as global warming, critical habitat restoration and solid waste reduction.

Furthermore, SWD's role in the transfer and disposal of county garbage and recyclables presents many

opportunities to directly and indirectly affect greenhouse gas emissions reduction, sustainable consumption, and waste reduction. Human activities are causing unprecedented rises in atmospheric concentrations of greenhouse gases. These emissions are resulting in increasingly severe changes to the climate system. Some of these emissions can be traced directly to solid waste through:

- The processes required to make and transport the things that we consume;
- Our usage of products that eventually end up as waste; and
- How we manage the waste we create.

SWD strives to minimize climate change impacts through operational practices, policies, planning, engineering, recycling, environmental services, and communications program. The products and services that we purchase, use and throw away have a significant impact on our climate. Greenhouse gas emissions result from significant energy use required at all stages of a product's life – from resource extraction and farming, manufacturing and processing, transportation and use, and finally to disposal. There are also different impacts on climate change depending on how our waste is managed. Fewer harmful greenhouse gas emissions are produced when we prevent waste in the first place by consuming less, reusing what we have and recycling more, and capturing landfill gas to produce energy.

Green building and sustainable development are interconnected with climate change and reducing greenhouse gas emissions. Every day we are faced with many consumption decisions that directly relate to how we site, plan, design, construct, operate and maintain our transfer stations. Each decision has a broader impact on the climate, and the sustainability of our recycling and waste management system financial and environmentally. By understanding the connection between materials, waste and climate change, we can make smarter consumption decisions that will help reduce environmental impacts.

LEADERSHIP AND INNOVATION

Transfer stations are the public face of the solid waste system. In 2011, King County transfer facilities received 796,188 tons of garbage through 738,566 customer visits. About 15,000 tons of garbage went directly to the Cedar Hills Regional Landfill, bypassing the transfer stations. The King County Solid Waste Division (SWD) is in the midst of modernizing its half-century-old transfer station network to meet the needs of its customers, while addressing potential impacts of climate change. This is done by design and constructing new recycling and transfer facilities to accommodate a growing population, industry changes, future environment and anticipated climate change.

The new transfer stations will play an important role in increasing regional recycling. Using an E.P.A. model, it is estimated that recycling and composting in King County reduce GHG emissions by approximately 1.62 million metric tons annually – the equivalent of removing 280,000 passenger cars from the road.

The Solid Waste Division has continuously illustrated innovative and cutting edge environmentally sustainable practices. Green building efforts are incorporated throughout a facilities life cycle, from siting and planning to design and construction, continuing through operations and maintenance. Sustainability is a central goal in all of our facilities. As a result, the facilities will save energy and water, provide a safer and healthier work environment as well as achieve dramatically reduced operating costs.

SHORELINE RECYCLING AND TRANSFER STATION

In 2008, the Shoreline Recycling and Transfer Station was King County's first project to achieve Leadership in Energy and Environmental Design (LEED) Platinum certification and the first industrial project in the world to earn LEED Platinum. Through sustainable design, the facility exceeded community expectations, offered more recycling services, and improved the site's ecology. Energy-saving and sustainable features include:

- A rainwater harvesting system reducing water needs by 57 percent, saving 254,000 gallons of drinking water every year;
- Natural daylight as the primary light source, reducing energy costs by 50 percent a year; and

• Natural ventilation system reducing energy needs for ventilation by 80 percent.

The Solid Waste Division worked closely on the rebuilding project with the Thornton Creek Alliance, an environmentally-focused community group with high interest in responsible development along salmon-bearing Thornton Creek, which flows through the site.

Neighbors of the Shoreline Transfer Station had hoped the old facility would close down and not be rebuilt. But with sustainable design as a core objective, King County and the design and construction team set out to change minds and collaboratively build a new facility that exceeded community expectations, offered more recycling services, and actually improved the site's ecology.

At the end of construction, tests showed improvements to the creek and King County was commended by the Thorton Creek Alliance for the environmental accomplishments.

The Shoreline project also acted as a model for green building tours with community partners such as the American Institute of Architects, Arcade Magazine and GreenTools Sustainable Cities Program. The tours offered an opportunity to experience LEED buildings in an industrial context while acting as a living laboratory of innovation. The project received honors as part of the AIA's annual green building program, "What Make's It Green". In addition, Shoreline received two more awards – the American Public Works Association Project of the Year Award in the Environment category and Northwest Construction Consumer Council Grand and Green Award, not given annually but only for special merit.

HOUGHTON TRANSFER STATION

The existing Houghton Transfer Station underwent new safety and mitigation improvements in 2011 improving safety and efficiency with less impact on the surrounding community allowing the station to continue operating until it can be replaced.

The Houghton Transfer Station was the first county project to pilot the King County Sustainable Infrastructure Scorecard and achieved a Gold rating level. The Sustainable Infrastructure Scorecard uses basic concepts similar to the LEED® rating system, adapted to more appropriately apply to infrastructure projects in King County. The resulting Scorecard includes nine categories, including a set of prerequisites, seven sets of credits organized by key topics of sustainability, and an additional set of credits for enhanced performance.

The Houghton Transfer Station project was able to utilize green building and sustainable development practices in the design and construction of an existing facility, illustrating that green building practices do not have to be limited to new construction. In fact, there is a potential to save significant greenhouse gas emissions by reusing salvaged materials, recycling C&D materials, and incorporating efficiencies in energy and water use during facility renovation projects.

The project team found the Scorecard to be a useful tool to document which sustainable components were included, as well as efficiently communicate between the contractor and consultants when certain components were completed. Project team members have indicated that the Scorecard facilitated opportunities to showcase creativity and leadership, improving on the projects outcomes.

Onsite materials were reused such as the steel roof, columns and other components, saving the project approximately $150,000 versus the cost of replacing all the steel with new. Furthermore, by saving most of the existing building and not having to demolish the steel and concrete, the project saved about $133,000 in demolition and disposal costs.

In addition, 100 percent of adhesives and sealants used low-emitting materials that met South Coast Air Quality Management District (SCAQMD) standards, and 100 percent of paints used met Green Seal standards. Efforts to preserve and maintain natural site amenities include use of light-colored exterior surface treatments, and use of full cut-off lighting fixtures and low-wattage lamps to reduce light pollution. Improvements were made to the wastewater collection system including upgrades to the existing sewer pump station, as well as a newly installed vault to store contaminated storm water to significantly decrease the possibility of overflows during inclement weather.

For these significant achievements, the American Public Works Association's Washington State Chapter awarded King County with the "Project of the Year" in its category of "Structures Less than $5 Million."

BOW LAKE RECYCLING AND TRANSFER STATION

Since the 1940s, the site of King County's Bow Lake Transfer Station has been handling our region's waste—first as a landfill and then as a transfer station. The current facility is open 24 hours on weekdays and handles more than a third of King County's solid waste—the busiest in the County. Construction of the new facility at the existing site occurred throughout 2011 and reopened in 2012. This facility was designed and built to meet current building and environmental standards, improve safety and operational efficiencies and to accommodate projected future growth in the region.

Green features include solar panels, rainwater harvesting and energy efficient design. The new facility is predicted to use 63 percent less energy than a similar code-minimum project through the use of advanced heating and cooling technologies, efficient lighting systems, photovoltaic roof panels and daylighting design strategies. This level of savings reduces carbon dioxide emissions by 172 metric tons per year.

New compactors are expected to increase load efficiency and reduce the number of truck trips from the transfer station to the landfill by about one third. By implementing this practice, our system will save on fuel costs, reduce traffic and minimize wear on our local and regional road system.

In addition, many materials were locally sourced and have recycled content. With help from the LinkUp program, project specifications for asphalt were revised to require use of recycled asphalt roof shingles. This will contribute towards achieving LEED Gold certification.

The facility's water use is projected to drop by 59 percent through the use of water-efficient fixtures and landscaping, and a sophisticated rainwater harvesting. A 280,000-gallon underground stormwater detention vault will mitigate impacts of run-off from impervious surfaces. In addition, the new facility will maximize the use of sustainable building materials such as recycled concrete and 50 percent of lumber used will be certified by the Forest Stewardship Council.

Houghton's operations and maintenance staff have also taken initiative to implement green building efforts by repurposing onsite materials for public education signage. This extends King County's operational green building practices to the public and serves in our community education efforts.

Throughout 2011, the project remained on schedule and within budget, as well as successfully continued to serve both commercial and self-haul customers at the existing station during construction. Similar to Shoreline and Houghton transfer stations, the Bow Lake Recycling and Transfer Station diverted close to 100 percent of its construction and demolition waste from entering landfills. This important green building practice extends the life and capacity of the Cedar Hills Regional Landfill, which King County also owns and manages. As a result, rate payers of the system benefit as public investments have an increase rate in return.

Construction of the south processing area, where the majority of recycling will occur, is scheduled to be completed in 2013. When complete, visitors to the new station will find more recycling options than before with a devoted area for collecting recyclable and compostable material such as clean wood, scrap metal, yard waste and appliances. This station will also be the first to house a material processing and recyclable collection facility in conjunction with waste transfer operations. The facility has capacity for separating recyclable materials from the mixed municipal waste and baling these materials for shipment to off-site recycling facilities.

When complete, the new Bow Lake facility will not only be modernized, but will also be one of the most sustainable waste handling facilities in the region.

ENVIRONMENTAL SUSTAINABILITY FOR THE FUTURE

For future development, SWD will use design features, new technology, engineering controls, employee input, innovation, and collaboration to reduce energy consumption and greenhouse gas emissions, and create savings in operational costs. Through integrative design and process, future facilities will have the flexibility to accommodate collection and processing of recyclables to

meet future market demands. Managing waste as resources is the new paradigm, promoting market demand, diverting materials from the landfill and maximizing capacity of existing infrastructure.

Preliminary design for the new Factoria Recycling and Transfer Station began in 2011. Value engineering was performed on the preliminary design, and in response to several factors, the project footprint was significantly reduced. The project is at 60 percent design and on track to achieve LEED Gold certification. Based on the estimated future tonnages, the refuse compaction capability will reduce truck trips to the landfill from 45 to 30 trips per day which translates to a savings of 3,900 trips in the year 2030. In addition, the current building design model shows an estimated 25 percent energy savings compared to the baseline. Features and factors like these will contribute to our GHG emission reduction goals.

Two new future recycling and transfer stations are in the siting and planning phase. The objective is to site transfer stations strategically around the county for customer use, selecting sites that minimize or eliminate negative impacts to the natural environment and using site location and conditions to increase or optimize energy efficiency and reduce GHG emissions. The siting process for determining the location of new recycling and transfer stations is complex. While the driving force for siting these stations is based on local area service needs, a major goal of the siting process is to select sites that are environmentally acceptable and feasible from an engineering perspective and that allow impacts to the natural and built environment to be reduced, eliminated or mitigated. Features such as geology, soil, groundwater tables, flooding hazard, slope proximity to surface water, and site capacity are also factored into the siting process.

The division will seek community involvement and consider issues of equity and social justice throughout the siting process for the new Northeast King County and South County Recycling and Transfer Stations that will replace aged transfer stations.

While each of these projects has its own story and challenges, there exists a common thread of striving for environmental and operational excellence. The majority of sustainable building strategies used in these projects to date have resulted in very little capital cost premium, and the strategies that have had a higher upfront cost are expected to be offset by infrastructure and utility cost savings over time.

King County is implementing green building and operations practices countywide. This is an important goal for SWD and a continued regional priority. King County Executive Dow Constantine stated at King County's Green Building Summit, "One of my top priorities and a key goal in out King County Strategic Plan is protecting our environment and quality of life for future generations. We need to continue to push the envelope on saving energy and resources in all areas of county operations and construction."

PROFILES OF PROJECTS

Shoreline Recycling & Transfer Station
Size: 11 acre site, 76,000 square foot building
Location: Shoreline, Wash.
Date completed: 2008
Project team: Lisa Williams, Project Manager, King County Solid Waste Division
Owner: King County Solid Waste Division
Architect: KPG, Inc.
Contractor: Lydig Construction
Commissioning: Ecotone Commissioning

Houghton Recycling & Transfer Station
Size: 8.4 acre site, 15,144 square foot building
Location: Kirkland, Wash.
Date completed: January 2011
Project team: Francis Gaspay, Project Manager, King County Solid Waste Division
Owner: King County Solid Waste Division
Architect: Hummel Architects, p.c.
Contractor: PCL Construction Services, Inc.
Engineers: ABKJ/SAIC

Bow Lake Recycling & Transfer Station
Size: 25 acre site, 83,000 square foot building
Location: Tukwila, Wash.
Date new transfer station completed: July 2012
Final completion: August 2013 (anticipated)
Project team: Tom Creegan, Project Manager, King County Solid Waste Division
Owner: King County Solid Waste Division
Design Engineers: SAIC
Architect: KPG, Inc.
Contractor: Lydig Construction

Factoria Recycling & Transfer Station
Size: 15.5 acre site, 93,000 square foot building
Location: Bellevue, Wash.
Date completed: Spring 2016 (anticipated)
Project team: Dwin Ugwoaba, Project Manager, King County Solid Waste Division
Owner: King County Solid Waste Division
Architect: J.R. Miller & Associates
Engineers: HDR Engineering
Contractor: TBD Currently in design stage

For more information, visit the King County Solid Waste Division web site at: http://your.kingcounty.gov/solidwaste/index.asp.

SHORELINE RECYCLING AND TRANSFER STATION
LEED PLATINUM, 2008

HOUGHTON TRANSFER STATION
KING COUNTY SUSTAINABLE INFRASTRUCTURE SCORECARD GOLD, 2011

BOW LAKE RECYCLING AND TRANSFER STATION
PURSUING LEED GOLD, 2012 AND 2013

FACTORIA RECYCLING AND TRANSFER STATION
PURSUING LEED GOLD, 2016